Claims

What is claimed is:

1. A wireless communication system comprising:
   a) *M* antennas;
   b) transmit and control circuitry operatively coupled to the *M* antennas and adapted to:
      i) select *N* antennas from the *M* antennas based on control information;
      ii) create *N* data streams from information to be transmitted to a receiver; and
      iii) transmit the *N* data streams to the receiver via the *N* antennas.

2. The wireless communication system of claim 1 wherein the control information includes or is derived from channel conditions between the *M* antennas and a plurality of antennas of the receiver.

3. The wireless communication system of claim 2 wherein the receiver has *N* antennas.

4. The wireless communication system of claim 1 wherein the transmit and control circuitry are adapted to:
   a) select a redundant antenna other than the *N* antennas from the *M* antennas;
   b) apply a weighting factor to one of the *N* data streams to create a weighted data stream; and
   c) transmit the weighted data stream to the receiver via the redundant antenna concurrently with the *N* data streams, wherein transmission of the weighted data stream reinforces the one of the *N* data streams during transmission.

5. The wireless communication system of claim 4 wherein the transmit and control circuitry are adapted to apply a second weighting factor to

the one of the *N* data streams prior to transmitting the one of the *N* data streams, wherein the weighted data stream and the one of the *N* data streams having the second weighting factor are concurrently transmitted.

6. The wireless communication system of claim 4 wherein the weighting factor includes or is derived from channel conditions between the *M* antennas and a plurality of antennas of the receiver.

7. The wireless communication system of claim 4 wherein the *N* antennas are selected and the weighting factor is determined to optimize channel capacity.

8. The wireless communication system of claim 4 wherein the *N* antennas are selected and the weighting factor is determined to optimize signal-to-noise ratios.

9. The wireless communication system of claim 1 wherein the transmit and control circuitry are adapted to:

a) select a plurality of redundant antennas other than the *N* antennas from the *M* antennas;

b) apply weighting factors to a plurality of the *N* data streams to create weighted data streams; and

c) transmit the weighted data streams to the receiver via the redundant antenna concurrently with the *N* data streams, wherein transmission of the weighted data streams reinforces corresponding ones of the *N* data streams during transmission.

10. The wireless communication system of claim 9 wherein the transmit and control circuitry are adapted to apply second weighting factors to the corresponding ones of the *N* data streams prior to transmitting the corresponding ones of the *N* data streams, wherein the weighted data streams and the corresponding ones of the *N* data streams having the second weighting factors are concurrently transmitted.

11. The wireless communication system of claim 1 wherein the weighting factor is included in or derived from the control information.

12. The wireless communication system of claim 1 further comprising receive circuitry associated with at least one of the *M* antennas and the transmit and control circuitry, which is further adapted to receive the control information from the receiver.

13. The wireless communication system of claim 1 wherein to select the *N* antennas from the *M* antennas, the transmit and control circuitry is adapted to select the *N* antennas corresponding to a maximum determinant from channel matrices representing the channel conditions between the *M* antennas and *N* antennas of the receiver.

14. The wireless communication system of claim 1 wherein the receiver is a user element and the wireless communication system is a base station.

15. A method providing wireless communications via a wireless communication system comprising having *M* antennas, the method comprising:

a) selecting *N* antennas from the *M* antennas based on control information;

b) creating *N* data streams from information to be transmitted to a receiver; and

c) transmitting the *N* data streams to the receiver via the *N* antennas.

16. The method of claim 15 wherein the control information includes or is derived from channel conditions between the *M* antennas and a plurality of antennas of the receiver.

17. The method of claim 16 wherein the receiver has *N* antennas.

18. The method of claim 15 further comprising:
    a) selecting a redundant antenna other than the *N* antennas from the *M* antennas;
    b) applying a weighting factor to one of the *N* data streams to create a weighted data stream; and
    c) transmitting the weighted data stream to the receiver via the redundant antenna concurrently with the *N* data streams, wherein transmission of the weighted data stream reinforces the one of the *N* data streams during transmission.

19. The method of claim 18 further comprising applying a second weighting factor to the one of the *N* data streams prior to transmitting the one of the *N* data streams, wherein the weighted data stream and the one of the *N* data streams having the second weighting factor are concurrently transmitted.

20. The method of claim 18 wherein the weighting factor includes or is derived from channel conditions between the *M* antennas and a plurality of antennas of the receiver.

21. The method of claim 18 wherein the *N* antennas are selected and the weighting factor is determined to optimize channel capacity.

22. The method of claim 18 wherein the *N* antennas are selected and the weighting factor is determined to optimize signal-to-noise ratios.

23. The method of claim 15 wherein the transmit and control circuitry are adapted to:
    a) select a plurality of redundant antennas other than the *N* antennas from the *M* antennas;
    b) apply weighting factors to a plurality of the *N* data streams to create weighted data streams; and

c) transmit the weighted data streams to the receiver via the redundant antenna concurrently with the *N* data streams, wherein transmission of the weighted data streams reinforces corresponding ones of the *N* data streams during transmission.

24. The method of claim 23 wherein the transmit and control circuitry are adapted to apply second weighting factors to the corresponding ones of the *N* data streams prior to transmitting the corresponding ones of the *N* data streams, wherein the weighted data streams and the corresponding ones of the *N* data streams having the second weighting factors are concurrently transmitted.

25. The method of claim 15 wherein the weighting factor is included in or derived from the control information.

26. The method of claim 15 further comprising receive circuitry associated with at least one of the *M* antennas and the transmit and control circuitry, which is further adapted to receive the control information from the receiver.

27. The method of claim 15 wherein to select the *N* antennas from the *M* antennas, the transmit and control circuitry is adapted to select the *N* antennas corresponding to a maximum determinant from channel matrices representing the channel conditions between the *M* antennas and *N* antennas of the receiver.

28. The method of claim 15 wherein the receiver is a user element and the wireless communication system is a base station.

29. A wireless communication system comprising:

a) *M* antennas; and

b) transmit and control circuitry operatively coupled the *M* antennas and adapted to:

i) select *N* antennas from the *M* antennas based on control information;

ii) generate a plurality of data streams to be transmitted to a receiver;

iii) provide an inverse Fourier transform on the data streams to provide a plurality of orthogonal frequency division multiplex sub-carriers, such that the sub-carriers are allocated to the select *N* antennas based on the control information; and

iv) transmit the sub-carriers via the *N* antennas to the receiver.

30. The wireless communication system of claim 29 wherein the control information includes or is derived from channel conditions for the sub-carriers between the *M* antennas and a plurality of antennas of the receiver.

31. The wireless communication system of claim 30 wherein the receiver has *N* antennas.

32. The wireless communication system of claim 29 wherein the transmit and control circuitry are adapted to:

a) select a redundant antenna other than the *N* antennas from the *M* antennas;

b) apply a weighting factor to at least one of the sub-carriers for the plurality of data streams to create at least one weighted sub-carrier; and

c) transmit the weighted sub-carriers to the receiver via the redundant antenna concurrently with the sub-carriers, wherein transmission of the weighted sub-carriers reinforces the sub-carriers during transmission.

33. The wireless communication system of claim 32 wherein the transmit and control circuitry are adapted to apply second weighting factors to the sub-carriers, wherein the weighted sub-carriers and the sub-

carriers having the second weighting factors are concurrently transmitted.

34. The wireless communication system of claim 32 wherein the weighting factor includes or is derived from channel conditions between the *M* antennas and a plurality of antennas of the receiver.

35. A method providing wireless communications via a wireless communication system comprising having *M* antennas, the method comprising:

a) selecting *N* antennas from the *M* antennas based on control information;

b) generating a plurality of data streams to be transmitted to a receiver;

c) providing an inverse Fourier transform on the data streams to provide a plurality of orthogonal frequency division multiplex sub-carriers, such that the sub-carriers are allocated to the select *N* antennas based on the control information; and

d) transmitting the sub-carriers via the *N* antennas to the receiver.

36. The method of claim 35 wherein the control information includes or is derived from channel conditions for the sub-carriers between the *M* antennas and a plurality of antennas of the receiver.

37. The method of claim 36 wherein the receiver has *N* antennas.

38. The method of claim 35 further comprising:

a) selecting a redundant antenna other than the *N* antennas from the *M* antennas;

b) applying a weighting factor to at least one of the sub-carriers for the plurality of data streams to create at least one weighted sub-carrier; and

c) transmitting the weighted sub-carriers to the receiver via the redundant antenna concurrently with the sub-carriers, wherein

transmission of the weighted sub-carriers reinforces the sub-carriers during transmission.

39. The method of claim 38 further comprising applying second weighting factors to the sub-carriers, wherein the weighted sub-carriers and the sub-carriers having the second weighting factors are concurrently transmitted.

40. The method of claim 38 wherein the weighting factor includes or is derived from channel conditions between the *M* antennas and a plurality of antennas of the receiver.